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" ADVANCES IN SHORTWAVE THERAPY "

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Shortwave therapy was introduced 40 years ago for the treatment of acute and chronic infections. At that time it received justified attention and was confirmed from many sides (Schliephake). At present the success of this method of treatment has been largely forgotten, for simultaneously treatment with sulfanilamides and antibiotics was introduced as a new medicinal principle in the treatment of infections, with the known remarkable success.

Today we are aware however, that the triumphal success with antibiotics is not altogether without its problems. We have learned during the past 25 years that Paul Ehrlich's dream of "Therapia magna sterilisans" did not become absolute reality. Over sensitivity reactions of patients as well as other side effects to antibiotic therapy, especially resistance to certain stimulators limit the use of antibiotics considerably today.

It therefore is good to remember again, that we have a treatment principle in shortwave=therapy, which has the peculiarity of presenting NO DANGER. This has been emphasized unanimously by all authors. The author has not observed a single injury to living tissue in about 800 patients, especially no BURNS.

Shortwave-therapy in bacterial infections

The following report will deal with the successful treatment with shortwave therapy in patients with bacterial infections. Whereas the original shortwave therapy by Schliephake was carried out by continuous treatment with 12-m waves, the recently used new Diapulse shows a series of single characteristics which represent a true extended development. The wavelength (11 m) is essentially the same.

The main characteristics of the apparatus are:

The primary current strength is 1025 watt, i.e., 3 to 5 times that of the usual apparatus. This indicates an enormous increase in penetration. The apparatus produces an "explosive" current thrust in that a breaker interrupts the electromagnetic current flow at a time of 65 μ /sec, without influencing the intensity. The subsequent interval alternates between 12400 μ /sec with slowest "pulsation" (80/sec) to 1660 μ /sec (600/sec). A degree-indicator makes variations of pulsations from 80 - 160 - 300 up to 400 - 500 - 600 pulses per second possible.

This arrangement makes possible:

The transfer of electromagnetic energy to the patient of intensities between approximately 300 to over 900 watts (secondary energy) with good tolerance of living tissue, whereas the average intersection is reduced to about 40 watt by the long interval.

The thereby originating heat production is carried off through the long interval by the peripheral circulatory system into the body and therefore not effectively locally. This has been proven experimentally (Wildervan et al). ^{check}

The heat effect practically plays no role.

The penetration depth is variable. The measurement instrument shows the simple figures of 1 - 6. They correspond approximately to a penetration increase of over 2.5 cm per adjustment number, so that the number 3 equals a depth of 8.0cm, the number 6 about 17 - 18 cm (phantom measurements of Remington Rand Co., New York).

Adjustment time. The pulse apparatus has a time meter, which gives off a bell signal and automatically cuts off the current.

Dosage. In accordance with these apparative possibilities a shortwave treatment for example, is carried out as follows: 600 - 6 - 10, i.e., a pulse frequency of 600/sec at a penetration of No. 6 and a duration of 10 minutes.

An additional development is the placement of the induction cable in a steel drum, which can be brought to the patient by means of a movable ball-joint. The drum must be brought very close to the flow-through part of the body, so that there is no layer of air between the drum and the body surface. When this is anatomically impossible (maxillary lateral cavities) the drum must be placed as closely as possible, since good placement of the center of the pulse drum is of great importance, one should treat patients only in the prone position, since this position is much more fixed than the sitting position. The electromagnetic waves penetrate clothing without difficulty yes, even casts (indicative for fracture treatment).

Importance of electromagnetic energy

A. Ginsberg and the physicist Milinowski have solved the problem of how enormous amounts of electromagnetic energy can be used without injury to living tissue. They use the pulsating application. The bactericidal effect of short electromagnetic waves depends essentially on 2 factors: the strength of the electromagnetic field and the type of explosive application with short duration.

It must be emphasized again that the principle of this application is not the effect of heat, which unfortunately has prevented the use of shortwave therapy for infections in the USA for so long, but the electromagnetic energy.

Table 1. Review of the average treatment time and intensity of shortwave treatment in 40 of my cases.

	Dosage	days
Acute infections	7.5	5.25
Chronic infections	25 π	25
Superficial infections	9	6
Deep lying infections	25	27
Antibiotic resisting infections	14.6	14

Experimental Bases

The theoretical experimental basis is still everything but assured. Bruce Cameron was able to show experimentally histologically, that wound healing definitely could be speeded up, when the wound was flowed through with shortwaves. Dogs treated thus showed in the microscopic pictures of excised wound preparations infiltrations of leucocytes, phagocytosis, histiocyte activity, etc. within 24 to 48 hours, whereas the control animals showed these appearances only after 3 to 4 days (Cameron). Wong in a similar test series, found in addition, that scar tissue had a much better elasticity under shortwave treatment than the compared group not treated with shortwave. By measurement he found the tensil strength in treated animals 18 to 25% higher than in the non-treated controls (Wong). This has recently been confirmed by Goes.

The flow-through of gammaglobulin with electromagnetic vibration with a frequency of 13.10 - 14.60 megacycles (1 megacycle = 1×10^6 vibrations per second = 1 Mc) results in characteristic changes, which are expressed in the electrophoresis curves as well as in the antibody formation. They are especially distinct in the area between 13.30 and 13.50, as Bach et al were able to show. Interestingly these frequencies are very close to the value of 13.56, and if one remembers wave physics, it appears at least striking that 13.56 Mc is the next lowest harmony for the frequency 27.12. It is therefore hardly surprising that recently similar gammaglobulin changes were found in the area of 2712 Mc (Niemeyer).

Shamos and Lavine discovered a piezoelectrical effect in bone under static pressure similar to such other multicristalline structures (Shamos et al), after Basset and Becker 1962 and before them Fukada and Yasuda in 1957 found similar results in their experimentation. It should be emphasized that the

macromolecules of hyaluronic acid salts play a special role in this, and that hyaluronic acid belongs to the collagens. Bassett even goes so far as to state that "it is conceivable to determine the nature and manner of bone growth with exteriorly applied electromagnetic fields."

These few examples are to show, that the short electromagnetic waves with their high frequencies must be credited with a far more important biological role than with the one-sided "exclusively heat effect". They all have in common that neither the wound healing speed up nor the gammaglobulin changes, etc. have anything to do with heat development, but very much (perhaps all) with the powers of electromagnetic fields.

Personal clinical experiences

Personal experiences in the area of anti-infectious effect was obtained during 1964 - 1968. The series contains 40 cases, of which 4 shall be discussed casuistically.

Case 1. 47 year old veteran with a furuncle on his back; 7.5 cm diameter, 7 mm elevation of skin surface, hot, painful. Small opening in the center with outflow of small amount of serous, purulent fluid. Treated by himself for 4 days unsuccessfully with application of hot compresses.

Therapy: Diapulse No. 1 = 600 - 6 - 15 twice daily. After 5 treatments within 48 hours reduction of swelling, diameter of inflammation 5 cm, no elevation, closure of wound. Diapulse 7: infiltration 3 cm, still hard, but no longer painful. Diapulse No. 11; infiltration 2.5 cm. After 4 additional treatments reduction to 1.2 cm. No longer inflammatory reaction. in total 15 treatments in 9 days.

Total healing of infection.

Case 2. 45 year old man. Furuncle across the left lateral gluteus, 5 cm in diameter, red, hard infiltration, very painful.

Therapy: Diapulse 600 - 6 - 10, after 4 treatments (48 hours later) no pain, swelling definitely reduced. Subsequent to Diapulse No. 7 infiltration back to

1.3 cm. Treatment ended. The remaining infiltration disappeared spontaneously within the next 5 days.

These two cases demonstrate the effect of local inflammation. The therapy is of importance since it demonstrates an antibacterial effect, even if the stimulator is antibioticly resistant.

Case 3. 31 year old engineer with chronic dermatitis of the scrotum and perineum following trauma and left lateral orchidectomy. To date reinfection every 2 - 4 month since the operation. Repetition of surgery 3 months later because of abscesses. Passing healing. New infection 1 year later, again due to residue of chronic infection. Because of massive antibiotic therapy development of oversensitivity to all penicillin preparations. Bacteriological examination mostly negative. No effect and resistance to aureomycin, erythromycin, Lincomycin, chloromycetin and streptomycin. In addition ~~xx~~ ill with arteriitis obliterans (Buerger).

6 months subsequent to last operation partial half lateral paresis on left, which at first retreated well. During course of this illness new appearance of local infection in surgical area with shivering fever, swelling and redness of genitalia, scrotum and perineum. Renewed antibiotic treatment with tetracyclin in large dosages (maximum 2 gm per day, later 1.5 gm, then 1 gm) over a period of 6 weeks. Following initial improvement and fall in temperature, renewed rising temperature to 38°C. In 43 days the patient had received a total of 61 gm of tetracyclin.

Findings. Scrotum the size of a golfball, very red, hot, very painful.

Perineum and the medial parts of the gluteus red, inflammatory, edematous to the height of the 4th lumbar vertebra.

Therapy: Diapulse 600 - 6 - 15, patient on back. After the 2nd treatment (=36 hours after start) scrotum again normal size, heat and redness reduced. reduced dermatitis, decrease in pain. Subsequent to Diapulse No. 5, pain completely gone. Rapid improvement of general well being. Temperature normal

between 36.8 and/or 37.0°C. No more shivering. Total series 15 treatments in 17 days. During this time antibiotics discontinued.

Case 4. 60 year old woman with paronychia at the inner rim the the nail bed of the right index finger with intense pain. Initial improvement after hot hand bathing and erythrocin 250 mg 4 times daily. Four days later worsening of condition. Increase in swelling, up to size of cherry, unbearable pain.

Therapy: Diapulse No. 1 = 600 - 6 - 15, decrease in pain and swelling within hours. Swelling reduced by half on next day. Redness disappearing, pain localized and decreasing. Additional treatment with same dosage. Symptoms disappeared 2 days later. Finger almost healed. Total treatment 5 within 2 1/2 days.

Discussion of Results of treatment

The four casuistically discussed cases are typical for the series of 40 cases. All reacted in like manner to diapulse. Differences existed only in the number of treatments or their duration as well as the length of the radiation series. The results are summarized in Table 1. Acute infections react quicker than chronic ones, namely, in 7.5 diapulse treatments as against 25. The retreat too is understandably quicker, 5.5 days as against 25. Superficial infections react quicker than deeplying ones.

Individual cases may require very long and intensive treatment. A chronic osteomyelitis improved with 45 treatments in 25 days. How much 2 treatments per day improve the results is not known todate and needs clarification. The same holds true in regard to whether electromagnetic treatment to the liver area, the spleen and/or the adrenals can be applied therapeutically as an additional stimulus to the reticulo-endothial system. (Ginsberg) recommended 400 - 4 - 10).

In total, literature reports about 1500 observations which gave positive results. S. Splitter treated 110 patients with subacute sinusitis. Healing occurred in 93, improvement in 17 other cases. Street demonstrated excellent results in postoperative hip infections (100 cases). Young reports a review of 2541 cases, treated between 1962 and 1964. In total, there is material on almost 7000 cases, ~~by~~ 1141 of which are infectious cases. The non-infectious cases by Ginsberg demonstrate the calcium absorption especially well. In addition, there are reports of good results in rheumatic, arthritic and neurological diseases.

Summary

A new shortwave apparatus (diapulse) is briefly described and the specialties of its construction pointed out. The manner of effect is demonstrated on 4 casuistic cases of acute and chronic residual infections of the skin (furuncle, panaritium, chronic dermatitis). Literature with a total of 1141 cases is cited, with 40 personal cases. There is a total healing effect of over 90%. The significance of shortwave treatment in antibiotic resistant cases is specially pointed out, since the therapy here, ~~results~~ without side effects and reactions of the patient, and/or further worsening of his total wellbeing, gave positive results. It is also emphasized that heat production with the use of this apparatus is practically excluded, so that the term diathermy must be dropped.